

# इंटरनेट

# मानक

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Mazdoor Kisan Shakti Sangathan

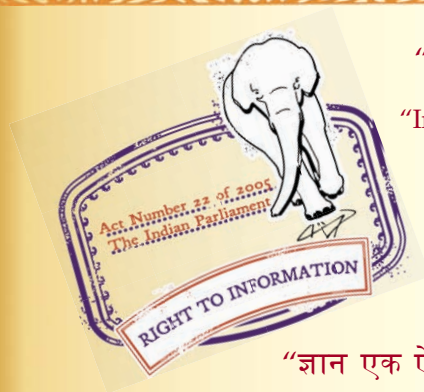
“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 8872-3-2 (1979): Variable Resistors, Part 3: Precision,  
Section 2: Type Vrp2p [LITD 5: Semiconductor and Other  
Electronic Components and Devices]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”



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Indian Standard

## SPECIFICATION FOR VARIABLE RESISTORS

## PART III PRECISION

## Section 2 Type VRP2P

**0. General** — This standard shall be read in conjunction with IS : 8872 ( Part I ) - 1977 ' Specification for variable resistors: Part I General requirements and methods of tests '.

**1. Scope** — This standard covers wire-wound ten-turn precision resistors of rotary type both for bush and servo mounting, required in professional applications.

**2. Outline Drawing and Dimensions** — The outline drawing and dimensions of various styles shall be in accordance with Fig 1, Table 1.

**3. Ratings and Characteristics**

a) Electrical ratings	See Table 1
b) Mechanical characteristics	See Table 1
c) Selection tolerance	$\pm 1$ percent, $\pm 5$ percent
d) Stability	$\pm 5$ percent
e) Function conformity tolerance	$\pm 0.025$ percent, $\pm 0.10$ percent, $\pm 1.0$ percent
f) Temperature characteristics of resistance	$\pm 0.003$ percent/ $^{\circ}\text{C}$ , $\pm 0.01$ percent/ $^{\circ}\text{C}$
g) Maximum surface temperature	$150^{\circ}\text{C}$
h) Mechanical endurance	100 000 cycles
j) Typical construction	Wire-wound

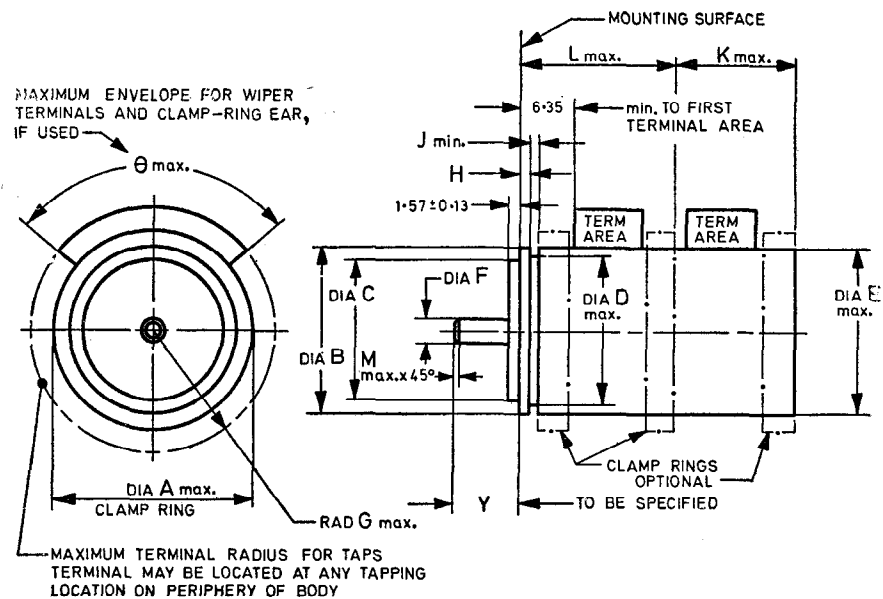
**4. Environmental Conditions**

a) Temperature severity	65/150
b) Damp heat severity	56 days
c) Bump	4 000, 40 g
d) Vibration	10-2 000 Hz, 150 m/s <sup>2</sup>
e) Shock	1 km/s <sup>2</sup>
f) Acceleration ( steady state )	170 m/s <sup>2</sup>
g) Low air pressure	4.4 kPa
h) Rapid change of temperature	+ 150 $^{\circ}\text{C}$ to - 65 $^{\circ}\text{C}$

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All dimensions in millimetres.

Style	Dia A Max	Dia B	Dia C	Dia D Max	Dia E Max	Dia F	Dia G Max	H	J Min	L Max	K Max	O Max	Chamfer M Max × 45°
VRP2P—2	26.97	22.23 $\begin{smallmatrix} + 0.13 \\ - 0.25 \end{smallmatrix}$	19.05 $\begin{smallmatrix} + 0 \\ - 0.01 \end{smallmatrix}$	19.84	23.01	3.18 $\begin{smallmatrix} + 0 \\ - 0.01 \end{smallmatrix}$	16.66	1.57 ± 0.13	1.45	41.28	36.53	105°	0.41
VRP2P—3	41.28	36.50 $\begin{smallmatrix} + 0.13 \\ - 0.25 \end{smallmatrix}$	33.32 $\begin{smallmatrix} + 0 \\ - 0.01 \end{smallmatrix}$	33.35	37.29	6.35 $\begin{smallmatrix} + 0 \\ - 0.02 \end{smallmatrix}$	27.79	2.36 ± 0.13	1.85	57.15	50.80	100°	0.41
VRP2P—5	57.13	50.80 $\begin{smallmatrix} + 0.13 \\ - 0.25 \end{smallmatrix}$	47.63 $\begin{smallmatrix} + 0 \\ - 0.03 \end{smallmatrix}$	47.63	51.59	6.35 $\begin{smallmatrix} + 0 \\ - 0.02 \end{smallmatrix}$	34.91	2.36 ± 0.13	1.85	57.15	50.80	100°	0.79

FIG. 1 OUTLINE DRAWING AND DIMENSIONS

**TABLE 1 RATINGS**

(Clauses 2 and 3)

Style	Rated Dissipa- tion at 85°C ( see Note 1 )	Resistance Range	Maxi- mum Conti- nuous Working Voltage	Effective Electrical Rotation	Total Mechanical Rotation	Spindle Length	Maximum Operating and Running Torque				Resis- tance Law	Mechanical Endurance ( Cycles ) ( see Note 2 )	Maxi- mum Weight ( see Note 3 )	End Stop Torque
							Ten-Turn Single Cup		Per Each Additional Ten-turn Cup					
							Operat- ing	Run- ning	Operat- ing	Run- ning				
(1)	(2) W	(3)	(4) V	(5)	(6)	(7) mm	(8) mN.m	(9) mN.m	(10) mN.m	(11) mN.m	(12)	(13)	(14) g	(15) N.m
VRP2P-2A	2.0	100Ω-50kΩ	500	3 600 $\begin{smallmatrix} + 4^{\circ} \\ - 0^{\circ} \end{smallmatrix}$	3 600 $\begin{smallmatrix} + 10^{\circ} \\ - 0^{\circ} \end{smallmatrix}$	9.53 $\pm$ 0.79	4.94	4.24	4.24	3.53	Law A	100 000	40.8	0.339
VRP2P-2B	2.0	100Ω-50kΩ	500	3 600 $\begin{smallmatrix} + 4^{\circ} \\ - 0^{\circ} \end{smallmatrix}$	3 600 $\begin{smallmatrix} + 10^{\circ} \\ - 0^{\circ} \end{smallmatrix}$	25.4 $\pm$ 0.79	4.94	4.24	4.24	3.53	Law A	100 000	40.8	0.339
VRP2P-3A	3.0	200Ω-200kΩ	500	3 600 $\begin{smallmatrix} + 4^{\circ} \\ - 0^{\circ} \end{smallmatrix}$	3 600 $\begin{smallmatrix} + 4^{\circ} \\ - 0^{\circ} \end{smallmatrix}$	9.53 $\pm$ 0.79	7.062	4.94	5.65	4.24	Law A	100 000	141.75	—
VRP2P-3B	3.0	200Ω-200kΩ	500	3 600 $\begin{smallmatrix} + 4^{\circ} \\ - 0^{\circ} \end{smallmatrix}$	3 600 $\begin{smallmatrix} + 4^{\circ} \\ - 0^{\circ} \end{smallmatrix}$	25.4 $\pm$ 0.79	7.062	4.94	5.65	4.24	Law A	100 000	141.75	—
VRP2P-5A	5.0	200Ω-0.25MΩ	500	3 600 $\begin{smallmatrix} + 4^{\circ} \\ - 0^{\circ} \end{smallmatrix}$	3 600 $\begin{smallmatrix} + 10^{\circ} \\ - 0^{\circ} \end{smallmatrix}$	9.53 $\pm$ 0.79	14.124	7.062	14.124	7.062	Law A	100 000	226.8	4.34
VRP2P-5B	5.0	200Ω-0.25MΩ	500	3 600 $\begin{smallmatrix} + 4^{\circ} \\ - 0^{\circ} \end{smallmatrix}$	3 600 $\begin{smallmatrix} + 10^{\circ} \\ - 0^{\circ} \end{smallmatrix}$	25.4 $\pm$ 0.79	14.124	7.062	14.124	7.062	Law A	100 000	226.8	4.34

**Note 1** — When ten turn units are gauged, the first cup shall be full wattage rating, the remaining cups will be 75 percent of rated wattage.

**Note 2** — The variable resistor shall be capable of operation up to 100 rev/min.

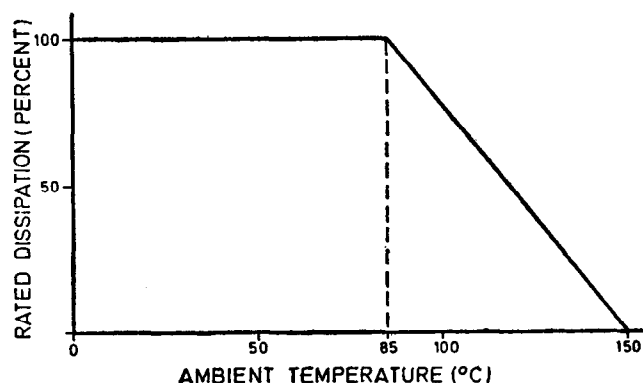
**Note 3** — For each additional cup, the maximum additional weight shall be 27.2 g for VRP2P-2, 113.4 g for VRP2P-3 and 154.2 g for VRP2P-5.

**Note 4** — There shall be no more than two cups gauged.

**Note 5** — For independent linearity the phasing between the cups shall be within  $\pm 1^\circ$ . This shall be measured, with respect to the first cup, starting from the counter-clockwise end point.

## IS : 8872 ( Part III/Sec 2 ) - 1979

**5. Derating** — Variable resistors covered by this standard are derated linearly from 100 percent rated dissipation at 85°C to zero dissipation at 150°C. The dissipation at temperatures below 85°C is the rated dissipation. Reference should be made to the derating curve shown below to find out the dissipation at other temperatures.



**6. Marking** — See 6 of IS : 8872 ( Part I ) - 1977.

**7. Material, Construction and Workmanship** — See 5 of IS : 8872 ( Part I ) - 1977.

### 8. Tests

#### 8.1 Classification of Tests

**8.1.1 Type tests** — The procedure for type approval shall be in accordance with IS : 2612-1965 'Recommendation for type approval and sampling procedures for electronic components'. The sequence of type tests and grouping of samples for type approval shall be in accordance with Table 2.

**8.1.1.1 Number of samples** — The manufacturer shall submit for each rated dissipation, the number of samples as given below:

Highest value	13*
Lowest value	13*

**Note** — When servo-mounted types are submitted for qualification approval and qualification is desired for bushing mounted units of the same physical size and construction (except for face plate); 3 additional samples with bushing mounts shall be submitted. These samples shall be subjected to Group '0' tests.

**8.1.2 Routine tests** — The following tests shall be carried out on each and every variable resistor:

- Visual examination,
- Electrical continuity,
- Total resistance, and
- Sealing ( when applicable ).

**8.1.2.1** If during routine tests, more than 10 percent of the lot fails, the entire lot may be rejected.

**8.1.3 Acceptance tests** — For the purpose of the acceptance of the lot, all the resistors shall be subjected to the tests specified in 8.1.2. Following this two groups of samples ( Group A and B ) shall be selected (see Appendix B of IS : 2612-1965 ) and the resistors shall be subjected to the tests as specified in Table 3 in the given order.

**8.2 General Conditions for Tests** — See 7 of IS : 8872 ( Part I )-1977. The same measuring set shall be used for any one test but not necessarily for all tests.

**8.2.1** The test schedule with test conditions and requirements after each test for the variable resistors covered by this standard shall be in accordance with Table 4.

\*Of these 13 samples, 11 are required for carrying out the type tests and two are to be kept as spare.

TABLE 2 TYPE TEST

( Clause 2 )

Group	Title of Test	Number of Samples		Clause Ref in IS : 8872 ( Part I ) - 1977
		Highest Value	Lowest Value	
(1)	(2)	(3)	(4)	(5)
0	Visual examination			9.1
	Dimensions			9.1.1
	Weight			—
	Electrical continuity			8.1
	Total resistance			8.2
	Minimum terminal resistance	13	13	8.3
	Angle of effective rotation			8.6
	Resistance law			8.7
	Voltage proof ( one minute )			8.9
	Insulation resistance			8.10
	Operating torque			9.2
	End-stop torque ( when applicable )			9.4
	Sealing			11.5
	Function conformity tolerance			8.15.2
	Peak noise ( equivalent ) noise resistance ( ENR )			8.12.3
	Lateral runout			9.13.1.1
	Spindle runout			9.13.1.2
	Pilot — surface runout			9.13.1.3
	Total mechanical rotation ( applicable only to resistors with stops )			9.13.5
	End voltage			8.15.3
	Taps ( when applicable )			8.15.1
	Mechanical backlash			9.13.4
1	Solderability			9.8.3
	Robustness of terminations			9.7
	Bump			9.10
	Vibration	3	3	9.9
	Shock			9.11
	Acceleration ( steady state )			9.12
	Rapid change of temperature			10.5
2	Climatic			10.1
	Damp heat ( long term )	2	2	10.2
3	End play			9.13.2
	Side play	2	2	9.13.3
4	Life ( mechanical )			
	Life ( electrical )	2	2	11.3
5	Temperature characteristic of resistance	2	2	11.4
6	Salt mist			8.11
Spares		2	2	10.8



**TABLE 3 ACCEPTANCE TESTS**  
( Clause 8.1.3 )

SI No.	Tests	Clause Ref in IS : 8872 ( Part I )-1977	AQL ( Percent Defective )	Inspection Level	D/N
(1)	(2)	(3)	(4)	(5)	(6)
1.	<i>Group A</i>				
	Dimensions	9.1.1	1 percent	II	
	Lateral run out	9.13.1.1			
	Spindle run out	9.13.1.2			
	Plot-surface runout	9.13.1.3			
	Side play	9.13.3			
	End play	9.13.2			
	Total mechanical rotation ( applicable only to resistors with stops )	9.13.5			
	Operating torque	9.2			
	Total resistance	8.2			
	Minimum terminal resistance	8.3			
	End voltage	8.15.3			
	Taps ( when applicable )	8.15.1			
	Voltage proof	8.9			
	Insulation resistance	8.10			
	Function conformity tolerance	8.15.2			
	Peak noise	8.13.3			
	Mechanical backlash	9.13.4			
2.	<i>Group B</i>				
	<i>Sub-group B<sub>1</sub></i>		4 percent	S3	N
	a) Solderability	9.8.3			
	<i>Sub-group B<sub>2</sub></i>		4 percent	S3	D
	a) Robustness of terminations	9.7			
	b) Rapid change of temperature	10.5			
	c) Mechanical endurance ( 20 000 cycles )	11.3			
	<i>Sub-group B<sub>3</sub></i>		4 percent	S3	N
	a) Electrical endurance ( 168 hours )	11.4			

N = Non-destructive, D = Destructive.

**Note 1** — Samples subjected to destructive tests and those having failed in non-destructive tests shall not be returned to the lot.

**Note 2** — For each group/sub-group, separate samples shall be drawn.

TABLE 4 TEST SCHEDULE AND REQUIREMENTS

( Clause 8.2.1 )

SI No.	Test	Clause Ref in IS : 8872 ( Part I )-1977	Condition of Test	Requirement																
(1)	(2)	(3)	(4)	(5)																
I) Group 0																				
a)	Visual examination	9.1	—	The workmanship and finish shall be satisfactory. The marking shall be legible																
b)	Dimensions	9.1.1	—	The dimensions of the resistors and their terminations shall conform to values given in Fig. 1																
c)	Weight	—	—	As in Table 1																
d)	Electrical continuity	8.1	—	There shall be no electrical discontinuity																
e)	Total resistance	8.2	—	The resistance value at 25°C shall correspond with the rated resistance taking into account the tolerance																
f)	Terminal resistance	8.3	—	The minimum terminal resistance shall not exceed 1 percent of the nominal total resistance value or 5 Ω whichever is greater																
g)	Angle of effective rotation	8.6	—	As in Table 1																
h)	Resistance law	8.7	—	—																
j)	Voltage proof	8.9	—	There shall be no breakdown or flashover																
k)	Insulation resistance	8.10	—	1 000 MΩ, Min																
m)	Operating torque	9.2	—	As in Table 1																
n)	Running torque	9.2 (Note)	—	As in Table 1																
p)	End-stop torque	9.4	—	There shall be no mechanical damage to the contact arm and stop, and the total mechanical travel shall not exceed by more than 1°																
q)	Sealing	11.5	—	—																
r)	Function conformity tolerance	8.15.2	For linear functions, the combined inherent errors of the measuring instruments shall not exceed:	As in 3(e)																
			<table><tr><th>Function* Tolerance</th><th>Required Accuracy of Measurement</th></tr><tr><td>Percent</td><td>Percent</td></tr><tr><td>1.0</td><td>± 0.100</td></tr><tr><td>0.5</td><td>± 0.050</td></tr><tr><td>0.25</td><td>± 0.025</td></tr><tr><td>0.10</td><td>± 0.010</td></tr><tr><td>0.05</td><td>± 0.005</td></tr><tr><td>0.025</td><td>± 0.002 5</td></tr></table>	Function* Tolerance	Required Accuracy of Measurement	Percent	Percent	1.0	± 0.100	0.5	± 0.050	0.25	± 0.025	0.10	± 0.010	0.05	± 0.005	0.025	± 0.002 5	
Function* Tolerance	Required Accuracy of Measurement																			
Percent	Percent																			
1.0	± 0.100																			
0.5	± 0.050																			
0.25	± 0.025																			
0.10	± 0.010																			
0.05	± 0.005																			
0.025	± 0.002 5																			

\*These tolerances shall be considered standard values. For ganged units, conformity measurements shall be performed on each individual cup of the gang, indexed against the front cup, and each cup of the gang shall be required to be within its tolerance.

( Continued )

TABLE 4 TEST SCHEDULE AND REQUIREMENTS — *Contd*

SI No.	Test	Clause Ref in IS : 8872 ( Part I )-1977	Condition of Test	Requirement																							
(1)	(2)	(3)	(4)	(5)																							
s)	Peak noise (equivalent noise resistance )	8.12.3	Number of cycles : 10 Rate of cycling : $4 \pm 1$ rev/min	100Ω																							
t )	Lateral runout	9.13.1.1	—	The lateral runout shall not exceed 0.050 8 mm per 25.4 mm of mounting surface radius or 0.025 4 mm whichever is greater																							
u)	Spindle runout	9.13.1.2	—	The spindle runout shall not exceed 0.051 mm for servo mount and 0.25 mm for bush mount per 25.4 mm of spindle length from mounting surface to point of measurement or 0.025 4 mm total, whichever is greater																							
v)	Pilot surface runout	9.13.1.3	—	The pilot surface runout shall not exceed 0.025 4 mm for servo mount and 0.05 mm for bush mount																							
w)	Total mechanical rotation	9.13.5	—	As in Table 1																							
x)	End voltage	8.15.3	—	The end voltage shall not be less than 0.5 percent of the total applied voltage																							
y)	Tap	8.15.1	—	$50 \pm 2$ percent of the effective electrical rotation																							
z)	Mechanical backlash	9.13.4	—	The operating shaft shall not move in excess of the applicable values without moving the contact arm, as given below:																							
<table><tr><th rowspan="2">Function Conformity Tolerance Percent</th><th colspan="2">Mechanical Backlash</th></tr><tr><th>VRP2P-2</th><th>VRP2P-3 &amp; VRP2P-5</th></tr><tr><td>1.0</td><td>1.5</td><td>1.0</td></tr><tr><td>0.5</td><td>1.5</td><td>1.0</td></tr><tr><td>0.25</td><td>1.5</td><td>1.0</td></tr><tr><td>0.1</td><td>1.0</td><td>0.5</td></tr><tr><td>0.5</td><td>1.0</td><td>0.5</td></tr><tr><td>0.25</td><td>0.5</td><td>0.25</td></tr></table>					Function Conformity Tolerance Percent	Mechanical Backlash		VRP2P-2	VRP2P-3 & VRP2P-5	1.0	1.5	1.0	0.5	1.5	1.0	0.25	1.5	1.0	0.1	1.0	0.5	0.5	1.0	0.5	0.25	0.5	0.25
Function Conformity Tolerance Percent	Mechanical Backlash																										
	VRP2P-2	VRP2P-3 & VRP2P-5																									
1.0	1.5	1.0																									
0.5	1.5	1.0																									
0.25	1.5	1.0																									
0.1	1.0	0.5																									
0.5	1.0	0.5																									
0.25	0.5	0.25																									

II) *First Group*

a)	Solderability	9.8.3	—	—
1)	Visual examination	9.1	—	There shall be no damage
b)	Robustness of terminations	9.7	—	—
1)	Visual examination	9.1	—	There shall be no damage
c)	Bump	9.10	4 000, 40 g	—
1)	Visual examination	9.1	—	There shall be no damage
2)	Electrical continuity	8.1	—	There shall be no electrical discontinuity
3)	Total resistance	8.2	—	Change in resistance value shall not exceed ± 5 percent

( *Continued* )

TABLE 4 TEST SCHEDULE AND REQUIREMENTS — *Contd*

SI No.	Test	Clause Ref in IS : 8872 ( Part I )-1977	Condition of Test	Requirement
(1)	(2)	(3)	(4)	(5)
d) Vibration		9.9	10-2 000 Hz, 150 m/s <sup>2</sup>	—
1) Visual examination		9.1	—	There shall be no damage
2) Electrical continuity		8.1	—	There shall be no electrical discontinuity
3) Total resistance		8.2	—	Change in resistance value shall not exceed $\pm 5$ percent
4) Function conformity tolerance		8.15.2	—	Function conformity tolerance shall not be more than 150 percent of the value recorded in Group 0
5) Peak noise		8.12.3	—	The peak noise resistance shall not exceed 500 $\Omega$
6) End play		9.13.2	—	—
7) Operating torque		9.2	—	Operating torque shall not increase more than 50 percent of the value recorded in Group 0
8) Running torque		9.2 ( Note )	—	Running torque shall not increase more than 50 percent of the value recorded in Group 0
e) Shock		9.11	1 km/s <sup>2</sup>	—
1) Visual examination		9.1	—	There shall be no damage
2) Electrical continuity		8.1	—	There shall be no electrical discontinuity
3) Total resistance		8.2	—	Change in resistance value shall not exceed $\pm 5$ percent
4) Function conformity tolerance		8.15.2	—	Function conformity tolerance shall not be more than 150 percent of the value recorded in Group 0
5) Peak noise		8.12.3	—	The peak noise resistance shall not exceed 500 $\Omega$
6) End play		9.13.2	—	—
7) Operating torque		9.2	—	Operating torque shall not increase more than 50 percent of the value recorded in Group 0
8) Running torque		9.2 ( Note )	—	Running torque shall not increase more than 50 percent of the value recorded in Group 0
f) Acceleration ( steady state )		9.12	170 m/s <sup>2</sup>	—
1) Visual examination		9.1	—	There shall be no damage
2) Electrical continuity		8.1	—	There shall be no electrical discontinuity
3) Total resistance		8.2	—	Change in resistance value shall not exceed $\pm 5$ percent
4) Function conformity tolerance		8.15.2	—	Function conformity tolerance shall not be more than 150 percent of the value recorded in Group 0
5) Peak noise		8.12.3	—	The peak noise resistance shall not exceed 500 $\Omega$
6) End play		9.13.2	—	—

( Continued )

TABLE 4 TEST SCHEDULE AND REQUIREMENTS — *Contd*

SI No.	Test	Clause Ref in IS : 8872 ( Part I )-1977	Condition of Test	Requirement
(1)	(2)	(3)	(4)	(5)
	7) Operating torque	9.2	—	Operating torque shall not increase more than 50 percent of the value recorded in Group 0
	8) Running torque	9.2 ( Note )	—	Running torque shall not increase more than 50 percent of the value recorded in Group 0
g)	Rapid change of temperature	10.5	—	—
	1) Electrical continuity	8.1	—	There shall be no electrical discontinuity
	2) Total resistance	8.2	—	Change in resistance value shall not exceed $\pm 5$ percent
	3) Function conformity tolerance	8.15.2	—	Function conformity tolerance shall not be more than 150 percent of the value recorded in Group 0
	4) Peak noise	8.12.3	—	The peak noise resistance shall not exceed $500\Omega$
	5) End play	9.13.2	—	—
	6) Operating torque	9.2	—	Operating torque shall not increase more than 50 percent of the value recorded in Group 0
	7) Running torque	9.2 ( Note )	—	Running torque shall not increase more than 50 percent of the value recorded in Group 0
h)	Climatic Sequence	10.1	—	—
	1) Dry heat	10.1.2	At upper category temperature + ( $150^{\circ}\text{C}$ )	—
	i) Insulation resistance	8.10	—	100 M $\Omega$ , Min
	2) Damp heat ( accelerated ) first cycle	10.1.3	—	—
	i) Visual examination	9.1	—	There shall be no damage
	3) Cold	10.1.4	2 hours at lower category temperature ( $-65^{\circ}\text{C}$ )	—
	i) Visual examination	9.1	—	There shall be no damage
	4) Low air pressure	10.1.5	—	—
	i) Voltage proof	8.9	i) 250 V rms for resistors $\leq 31.75$ mm diameter ii) 350 V rms for resistors $> 31.75$ mm diameter	There shall be no breakdown or flashover
	5) Damp heat ( accelerated ) remaining cycles	10.1.6	—	—
	i) Visual examination	9.1	—	There shall be no damage
	ii) Electrical continuity	8.1	—	There shall be no electrical discontinuity
	iii) Total resistance	8.2	—	Change in resistance value shall not exceed $\pm 3$ percent
	iv) Function conformity tolerance	8.15.2	—	Function conformity tolerance shall not be more than 150 percent of the value recorded in Group 0

( Continued )

TABLE 4 TEST SCHEDULE AND REQUIREMENTS — *Contd*

Sl No.	Test	Clause Ref in IS : 8872 ( Part I )-1977	Condition of Test	Requirement
(1)	(2)	(3)	(4)	(5)
	v) Insulation resistance	8.10	—	100 M $\Omega$ , <i>Min</i>
	vi) Peak noise	8.12.3	—	Equivalent noise resistance shall not exceed 500 $\Omega$
	vii) Operating torque	9.2	—	Operating torque shall not increase more than 50 percent of the value recorded in Group 0
	viii) Running torque	9.2 ( Note )	—	Running torque shall not increase more than 50 percent of the value recorded in Group 0
<b>III) Second Group</b>				
a)	Damp heat ( long term )	10.2	Voltage to be applied: 100 V	—
i)	Visual examination	9.1	—	There shall be no damage
ii)	Electrical continuity	8.1	—	There shall be no electrical discontinuity
iii)	Function conformity tolerance	8.15.2	—	Function conformity tolerance shall not be more than 150 percent of the values recorded in Group 0
iv)	Total resistance	8.2	—	Change in resistance value shall not exceed $\pm 3$ percent
v)	Insulation resistance	8.10	—	100 M $\Omega$ , <i>Min</i>
vi)	Peak noise	8.12.3	—	The peak noise resistance shall not exceed 500 $\Omega$
vii)	Operating torque	9.2	—	Operating torque shall not increase more than 50 percent of the value recorded in Group 0
viii)	Running torque	9.2 ( Note )	—	Running torque shall not increase more than 50 percent of the value recorded in Group 0
<b>IV) Third Group</b>				
a)	End play	9.13.2	—	The end play shall not exceed 0.13 mm
b)	Side play	9.13.3	—	The side play shall not exceed 0.051 mm
c)	Mechanical endurance	11.3	—	—
1)	Visual examination	9.1	—	There shall be no damage
2)	Electrical continuity	8.1	—	There shall be no electrical discontinuity
3)	Total resistance	8.2	—	Change in resistance value shall not exceed $\pm 5$ percent
4)	Function conformity tolerance	8.15.2	—	Function conformity tolerance shall not exceed 150 percent of the value recorded in Group 0
5)	Peak noise	8.12.3	—	Peak noise resistance shall not exceed 500 $\Omega$
6)	Insulation resistance	8.10	—	100 M $\Omega$ , <i>Min</i>
7)	Operating torque	9.2	—	Operating torque shall not increase more than 50 percent of the value recorded in Group 0

( Continued )

TABLE 4 TEST SCHEDULE AND REQUIREMENTS — *Contd*

Sl No.	Test	Clause Ref in IS : 8872 ( Part I )-1977	Condition of Test	Requirement
(1)	(2)	(3)	(4)	(5)
	8) Running torque	9.2 ( Note )	—	Running torque shall not increase more than 50 percent of the value recorded in Group 0
	9) Voltage proof	8.9	—	There shall not be any break-down or flashover
	10) Sealing	11.5	—	—
V) <i>Fourth Group</i>				
a)	Electrical endurance	11.4	—	—
1)	Visual examination	9.1	—	There shall be no damage
2)	Electrical continuity	8.1	—	There shall be no electrical discontinuity
3)	Total resistance	8.2	—	Change in resistance value shall not exceed $\pm 5$ percent
4)	Function conformity tolerance	3.15.2	—	Function conformity tolerance shall not exceed 150 percent of the value recorded in Group 0
5)	Peak noise	8.12.3	—	Peak noise resistance shall not exceed 500 $\Omega$
6)	Insulation resistance	8.10	—	100 m $\Omega$ , <i>Min</i>
7)	Operating torque	9.2	—	Operating torque shall not increase more than 50 percent of the value recorded in Group 0
8)	Running torque	9.2 ( Note )	—	Running torque shall not increase more than 50 percent of the value recorded in Group 0
9)	Voltage proof	8.9	—	There shall be no breakdown or flashover
10)	Sealing	11.5	—	—
VI) <i>Fifth Group</i>				
a)	Temperature characteristic of resistance	8.11	—	As in 3(f)
b)	Salt mist	10.3	The resistors mounted on an aluminium panel shall be thoroughly washed for 1 minute in free running tap water. Resistor shall then be placed in an oven maintained at $50 \pm 3^\circ\text{C}$ for a period of $24 \pm 4$ hours	—
1)	Visual examination	9.1	—	There shall be no damage
2)	Electrical continuity	8.1	—	There shall be no electrical discontinuity

## EXPLANATORY NOTE

While preparing this standard assistance has been derived from JSS : 5050 3 'Detail specification for resistors, variable, wirewound, precision' issued by Department of Defence Production, Ministry of Defence, New Delhi. The corresponding JSS patterns are: RVW 3; RVW 5, and RVW 7.